

THE NEOTROPICAL PREDACEOUS MIDGES OF THE GENUS  
*ALLUAUDOMYIA* (DIPTERA: CERATOPOGONIDAE)

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*Abstract.*— This study treats the 17 known Neotropical species of the predaceous midge genus *Alluaudomyia* Kieffer. Fourteen new species are described and illustrated: *amazonica*, *caribbeana*, *catarinensis*, *distispinulosa*, *estevezae*, *fittkaui*, *leei*, *nubeculosa*, *plaumanni*, *punctiradialis*, *sexpunctata*, *tenuiannulata*, *tripunctata*, and *youngi*. A diagnosis is given for the genus and a key is presented for the recognition of species. New Neotropical distribution records are given for *A. bella* (Coquillett) and *prima* Clastrier.

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The small, pale, conspicuously marked, predaceous midges of the genus *Alluaudomyia* Kieffer are well represented in all the major biogeographic regions of the world. There are 23 described Palearctic species, 9 Nearctic, 39 Afrotropical, 31 Oriental, and 27 Australasian species. By contrast, the Neotropical species have been neglected, and only two species have been previously described: *A. prima* Clastrier (1976) and *A. schnacki* Spinelli (in press). In this study we present descriptions of 14 new species and record the Nearctic species, *A. bella* (Coquillett), from Mexico and Grand Cayman, bringing the total number of Neotropical species to 17.

This study is based primarily on the collections of the National Museum of Natural History in Washington, where the holotypes and allotypes of the new species are deposited. Paratypes as available will be deposited in the following collections: British Museum (Natural History), London; California Academy of Sciences, San Francisco; Canadian National Collection, Agriculture Canada, Ottawa; Museo de La Plata, La Plata, Argentina; Museu de Zoologia, Universidade de São Paulo, Brazil, and Museum National d'Histoire Naturelle, Paris. The senior author acknowledges financial support from the Consejo Nacional de Investigaciones Científicas y Técnicas de La República Argentina.

For general terminology of the Ceratopogonidae see Wirth (1952a), Wirth et al. (1977), and Downes and Wirth (1981). The last 2 references contain keys to genera by which the genus may be identified.

**Genus *Alluaudomyia* Kieffer**

*Alluaudomyia* Kieffer, 1913: 12. Type-species, *Alluaudomyia imparunguis* Kieffer (monobasic).

*Neoceratopogon* Malloch, 1915: 310. Type-species, *Ceratopogon bellus* Coquillett (original designation).

*Prionognathus* Carter, Ingram, and Macfie, 1921: 309. Type-species, *Priono-*

*gnathus marmoratus* Carter, Ingram, and Macfie (original designation). Preocc. by LaFerte-Senectère, 1851.

*Thysanognathus* Ingram and Macfie, 1922: 244. New name for *Prionognathus* Carter, Ingram, and Macfie.

*Isoecacta* Garrett, 1925: 9. Type-species, *Isoecacta poeyi* Garrett (original designation) = *bella* (Coquillett).

Diagnosis (after Wirth, 1952b; Debenham, 1971; Wirth and Delfinado, 1974; Wirth and Grogan, 1981).—Small, moderately hairy midges with slender body. Eyes bare or hairy, contiguous or narrowly separated. Antenna 15-segmented; female with segments 3–10 long, 11–15 more so; male antenna with plume. Palpus 5-segmented; 3rd segment slender with small sensory pit. Wing with 1st radial cell obsolete, 2nd radial cell well developed; membrane without microtrichia, macrotrichia numerous on distal part of wing; usually 1 to 15–20 small dark spots present and sometimes with grayish streaks along veins. Legs slender, more or less hairy; female claws long, slightly unequal on fore and mid legs, very unequal on hind leg. Female with 1 or 2 spermathecae; genital segments with characteristic sclerotization for each species, an internal furca (9th sternite) usually present. Male terminalia highly modified; 9th tergite always long, usually with well-developed apicolateral processes; gonocoxite and gonostylus simple; aedeagus arched with large distal process. Parameres separate, shape varying with species; slender anterolateral apodeme present.

Immature stages.—Remm and Glukhova (1971) gave a good description and figures of the larva and pupa of *A. pentaspila* Remm and Glukhova; Glukhova (1977) figured the head, pharyngeal comb, and last body segment of the larva of *A. quadripunctata* (Goetghebuer). Grogan and Bystrak (1976) described the larva and pupa of *A. parva* Wirth; Grogan and Messersmith (1976) described the larva and pupa of *A. paraspina* Wirth; and Thomsen (1937) gave figures and a short description of the larva and pupa of *A. bella* (Coquillett) and *A. needhami* Thomsen. Glukhova (1979) described and illustrated the larva of *A. quadripunctata*, *A. pentaspila*, and *A. splendida* (Winnertz) in the U.S.S.R. and gave a key for their recognition. Wirth and Grogan (1981) described the immature stages of *A. bella*, *A. footei* Wirth, *A. megaparamera* Williams, *A. needhami*, *A. paraspina*, and *A. parva* in Maryland, and gave notes on larval habits. The larvae of *A. needhami* were observed to be predators of the larvae of *Atrichopogon* spp. at the water line on the emergent stems of aquatic shrubs. Spinelli (in press) described and illustrated the immature stages of *A. schnacki* Spinelli, and gave notes on the larval habits.

#### KEY TO NEOTROPICAL SPECIES OF ALLUAUDOMYIA

- |    |   |                        |
|----|---|------------------------|
| 1. | Wing with only 2 large, distinct, black spots, one at r-m crossvein, the other at tip of costa (Fig. 2); faint distal or posterior markings may also be present | 2                      |
| –  | Wing with more than 2 large, distinct, black spots (Fig. 1, 5)  | 11                     |
| 2. | Wing with faint distal and posterior markings in addition to the 2 distinct black spots at r-m crossvein and tip of costa (Fig. 8)                              | 3                      |
| –  | Wing without faint distal or posterior markings (Fig. 2)  | 4                      |
| 3. | Wing with only 3 faint distal markings, in cells R5, M1, and M2   | ..                     |
|    | .....   | <i>prima</i> Clastrier |

- Wing with 10 faint distal and posterior markings, 1 at wing margin and a 2nd submarginally, in each of cells R5, M1, M2, M4, and anal cell (Fig. 8) ..... *nubeculosa* n. sp.
- 4. Pattern of leg markings with many small brown rings and punctures; male genitalia elongate, distal portion of paramere with group of spinules (Fig. 4, 10) ..... 5
- Pattern of legs without these markings; male genitalia not elongated, distal portion of paramere without group of spinules ..... 6
- 5. Wing with small brown punctures along radius; bases of femora pale; caudal membrane of sternite 9 not spiculate (Fig. 10) ..... *punctiradialis* n. sp.
- Wing without small brown punctures along radius; bases of femora brown; caudal membrane of sternite 9 spiculate (Fig. 4) ..... *distispinulosa* n. sp.
- 6. Large species; wing length 1.3 mm or more ..... 7
- Small or medium-sized species; wing length less than 1.2 mm ..... 8
- 7. Legs with pale rings on femora and tibiae; claws unequal on all legs (Fig. 3) ..... *catarinensis* n. sp.
- Legs uniformly dark brown; tarsal claws subequal on all legs (Fig. 9) ..... *plaumanni* n. sp.
- 8. Fore and hind femora with bases broadly pale; aedeagus with basal arch reaching  $\frac{1}{4}$  of total length; tergite 9 with very long apicolateral processes; paramere expanded distally ..... *schnacki* Spinelli
- All femora dark at bases, hind femur with or without narrow sub-basal pale ring; aedeagus with basal arch reaching nearly  $\frac{3}{4}$  of total length; tergite 9 with poorly developed apicolateral processes or none; paramere not expanded distally ..... 9
- 9. Fore and hind tibiae brown at least on distal halves; male paramere slender, well sclerotized, with subapical process directed ventrally (Fig. 14) ..... *youngi* n. sp.
- All tibiae with narrow subapical pale rings; paramere stout or if slender, are poorly sclerotized with terminal filament ..... 10
- 10. Broad pale bands present subapically on mid femur and sub-basally on mid and hind tibiae; male paramere very slender, poorly sclerotized (Fig. 2) ..... *caribbeana* n. sp.
- These bands narrow; male paramere very stout and straight, distal portion abruptly recurved subterminally (Fig. 12) .. *tenuiannulata* n. sp.
- 11(1). Wing with more than 6 distinct black spots (Fig. 5) ..... 12
- Wing with 6 or less distinct black spots (additional obscure black streaks sometimes present near apices of medial and cubital branches) (Fig. 1) ..... 13
- 12. Wing with 12–13 distinct black spots; male paramere with distal portion tapering to sharp point; legs brownish with pale rings (Fig. 5) ..... *estevezae* n. sp.
- Wing with 8–10 distinct black spots; male paramere swollen club-shaped distally; legs yellow with brown bands ..... *bella* (Coquillett)
- 13. Wing with 6 distinct black spots (Fig. 11) ..... *sexpunctata* n. sp.
- Wing with 3–5 distinct black spots or streaks (Fig. 1) ..... 14

14. Wing with 4–5 black spots or streaks; hind tarsal ratio not more than 3.1; aedeagus longer than broad at base (Fig. 1) ..... 15  
 – Wing with 3 black spots; hind tarsal ratio 3.4; aedeagus about as long as broad at base (Fig. 13) ..... *tripunctata* n. sp.
15. Extreme base of fore and hind femora brownish; sternite 9 without caudomedian excavation; tergite 9 without apicolateral processes; gonostylus with an anterior subrectangular process projecting posteriorly; paramere not very long (Figs. 6, 7) ..... 16  
 – Extreme base of fore and hind femora pale; sternite 9 with caudomedian excavation; tergite 9 with apicolateral processes; gonostylus without anterior subrectangular process projecting posteriorly; paramere very long (Fig. 1) ..... *amazonica* n. sp.
16. Wing with black streaks near apices of veins M1, M2, M3 + 4, and Cu1; wing length not less than 1.05 mm; mid tibia with distinct subapical pale ring; hind tibia with broad median brown band; brownish species (Fig. 7) ..... *leei* n. sp.  
 – Wing without black streaks at apices of veins M1, M2, M3 + 4, and Cu1, at most these veins slightly infuscated; wing length 0.85 mm; mid tibia with faint subapical pale ring; hind tibia with narrow median brown ring; yellowish brown species (Fig. 6) ..... *fittkai* n. sp.

***Alluaudomyia amazonica* Spinelli and Wirth, NEW SPECIES**

Fig. 1

Female.—Wing length 1.05 (1.00–1.10,  $n = 3$ ) mm; breadth 0.41 (0.37–0.43),  $n = 3$ ) mm.

*Head*: Pale brown. Eyes bare, nearly contiguous. Antenna with lengths of flagellar segments in proportion of 26-17-16-16-16-18-20-20-25-25-27-25-33; antennal ratio 0.92 (0.90–0.95,  $n = 3$ ). Palpus (Fig. 1b) with lengths of segments in proportion of 11-16-17-12-21; 3rd segment with distal sensory area, without well-developed pit; last 3 segments more brownish than proximal 2. Mandible with 16 teeth.

*Thorax*: Yellowish brown, with small dark brown mottlings. Legs (Fig. 1d) brownish; fore coxa pale; narrow pale rings present on bases of fore and hind femora, subapically on all femora, and subbasally and subapically on tibiae; knees of fore and mid legs pale; tarsi pale brown except hind basitarsus dark brown; hind tarsal ratio 2.59 (2.55–2.62,  $n = 3$ ); claws (Fig. 1c) slender, unequal on all legs. Wing (Fig. 1a) nearly identical with that described for *Alluaudomyia leei*; costal ratio 0.63. Halter pale.

*Abdomen*: Pale brown; genital sclerotization as in Fig. 1f. One subspherical spermatheca (Fig. 1e) with conical neck; measuring 0.072 (0.065–0.076,  $n = 3$ ) mm long  $\times$  0.057 (0.053–0.060,  $n = 3$ ) mm broad.

Male.—Wing length 0.82 (0.75–0.85,  $n = 4$ ) mm; breadth 0.34 (0.30–0.35,  $n = 4$ ) mm. Similar to female, with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 48-20-18-18-17-17-17-17-20-27-40-38-45; antennal ratio 0.98 (0.97–1.00,  $n = 4$ ). Palpus with lengths of segments in proportion of 9-17-17-15-23. Costal ratio 0.52 ( $n = 4$ ). Hind tarsal ratio 2.2 (2.15–2.25,  $n = 4$ ).

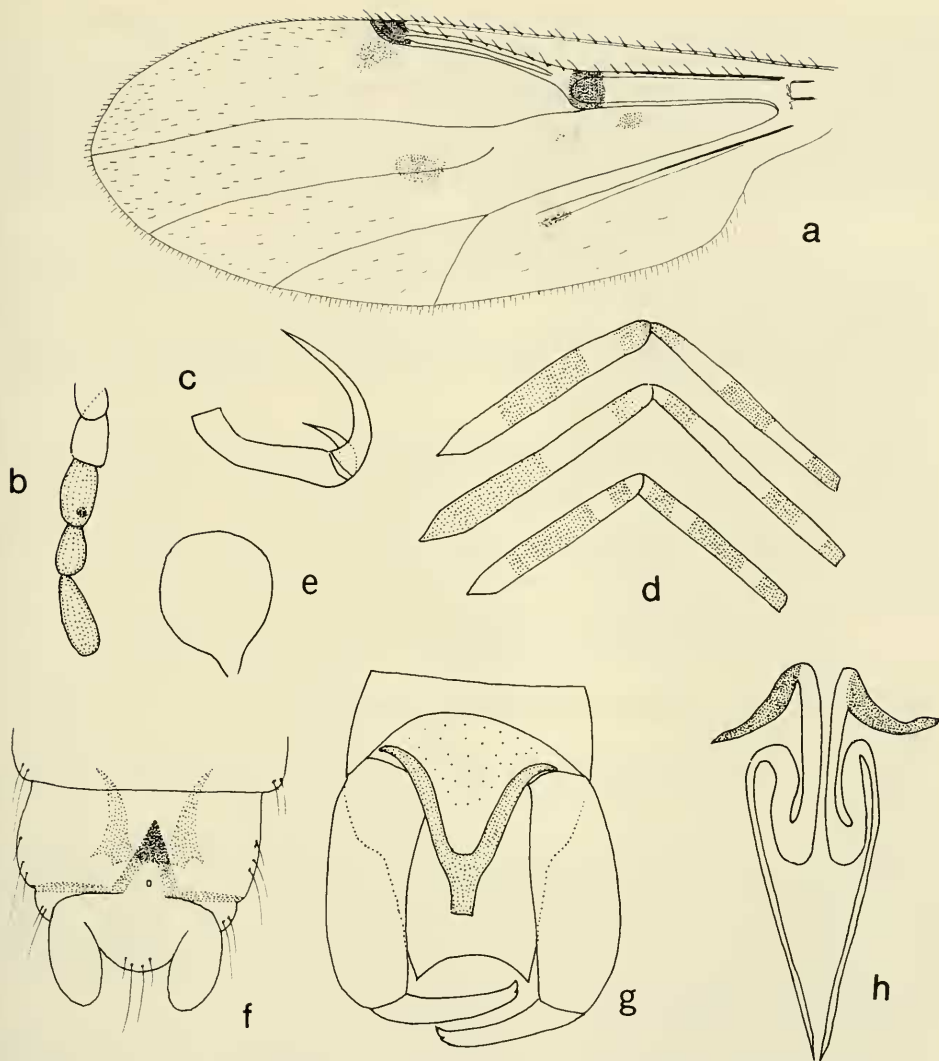


Fig. 1. *Alluaudomyia amazonica*; a-f, female; g-h, male: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genital sclerotization; g, genitalia; h, parameres.

**Genitalia** (Fig. 1g): short; sternite 9 with deep caudomedian excavation, posterior membrane spiculate; tergite 9 with truncate posterior margin and slender, well-developed apicolateral processes. Gonocoxite moderately slender, gonostylus nearly straight, with distinct apical tooth. Aedeagus longer than basal breadth, basal arch extending about  $\frac{2}{3}$  of total length. Parameres (Fig. 1h) nearly identical with those of *A. leei* (Fig. 7h), but the mid portion with the bulbous process more developed and distal portion longer and straighter.

**Distribution.**—Brazil.

**Types.**—Holotype ♀, allotype ♂, Brazil, Amazonas, Manaus, 21.ix.1969, H. A. Wright. Paratypes, 2 ♀, 3 ♂, as follows: BRAZIL: Same data as holotype, 2 ♂; Rio

Amazon, Ilha Parintius, 11.ix.1969, Wright, 2 ♀; Rio Solimões, 15.ix.1961, E. J. Fittkau, 1 ♂, at light.

Discussion.—The wing markings of *Alluaudomyia amazonica* are nearly identical with those of *A. leei* (Fig. 7a), but *amazonica* differs in the pale bases of the fore and hind femora, the male gonocoxites lack the heavily sclerotized mesal process at the base, and the slender tips of the male parameres are much longer.

#### *Alluaudomyia bella* (Coquillett)

*Ceratopogon bellus* Coquillett, 1902: 87 (male; District of Columbia; holotype in USNM).

*Alluaudomyia bella* (Coquillett); Wirth, 1952a: 195 (combination; Calif.; redescribed; figs.); Wirth and Grogan, 1981: 9 (redescribed; pupa; biology; distribution; figs.).

Distribution.—North America; common from Alaska to California and east to Nova Scotia and Florida; Bahamas, Cayman Islands, Mexico.

New records.—BAHAMAS: South Bimini I., v.1951, M. Cazier and W. Gertsch, 1 ♀, 1 ♂, CAYMAN ISLANDS: Grand Cayman, xii.1973, J. E. Davies, 2 ♂. MEXICO. Veracruz, Fortin de Flores, iv.1965, H. V. Weems, 1 ♂.

#### *Aluudomyia caribbeana* Spinelli and Wirth, NEW SPECIES

Fig. 2

*Alluaudomyia needhami* Thomsen; Wirth, 1952a: 196 (misident.; male; figs.; Calif.).

Female.—Wing length 1.02 (0.90–1.10,  $n = 10$ ) mm; breadth 0.40 (0.37–0.48,  $n = 10$ ) mm.

*Head*: Brownish. Eyes bare, contiguous for a distance equal to diameter of 1.5 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; lengths of flagellar segments in proportion of 22-14-14-16-20-20-23-23-25-27-33-38-34; antennal ratio 0.93 (0.90–0.97,  $n = 10$ ). Palpus (Fig. 2b) brownish; lengths of segments in proportion of 10-17-17-14-20; 3rd segment with distal pit bearing a very long sensillum. Mandible with 13–14 teeth.

*Thorax*: Brownish; scutellum paler. Legs (Fig. 2d) brownish, with pale rings subbasally on tibiae and subapically on femora and tibiae; knees pale on all legs; tarsi brownish except 4 distal tarsomeres on hind leg pale; hind tarsal ratio 3.00 (2.95–3.05,  $n = 10$ ); claws (Fig. 2c) long and slender, unequal on all legs. Wing (Fig. 2a) membrane whitish; 2 black spots, one proximad of r-m crossvein, 2nd at end of costa in cell R5; costal ratio 0.55 (0.53–0.56,  $n = 10$ ). Halter with knob infuscated.

*Abdomen*: Brownish. Genital sclerotization not pigmented. One elongated spermatheca (Fig. 2e), measuring 0.086 (0.080–0.093,  $n = 10$ ) mm long  $\times$  0.061 (0.058–0.065,  $n = 10$ ) mm broad.

Male.—Wing length 0.80 (0.70–0.85,  $n = 6$ ) mm; breadth 0.31 (0.28–0.34,  $n = 6$ ) mm; costal ratio 0.48 (0.46–0.50,  $n = 6$ ). Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 45-18-18-16-16-15-16-16-17-18-43-37-40; antennal ratio 0.99 (0.97–1.03,  $n = 3$ ). Palpus with lengths of segments in proportion of 10-16-15-13-21. Hind tarsal ratio 2.57 (2.43–2.70,  $n = 6$ ).

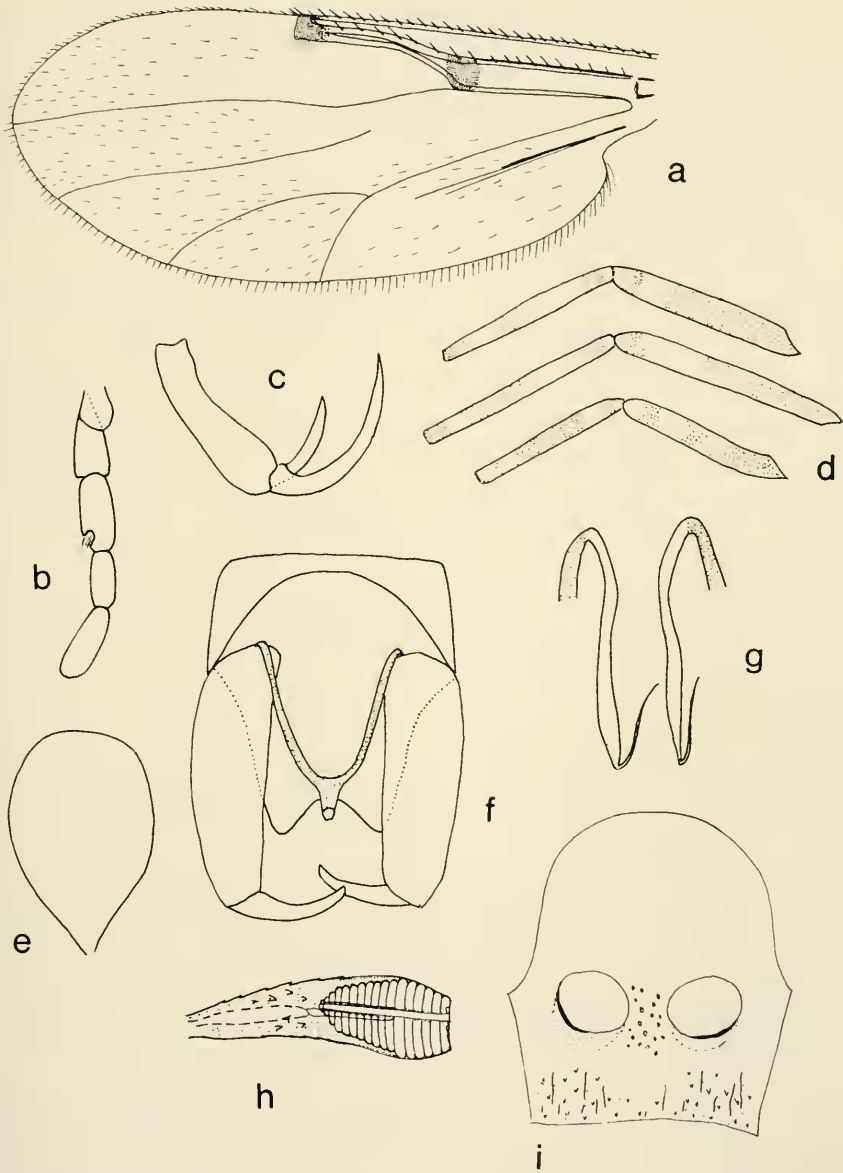


Fig. 2. *Alluaudomyia caribbeana*; a-e, female; f-g, male; h-i, pupa: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genitalia; g, parameres; h, respiratory horn; i, operculum.

**Genitalia** (Fig. 2f): Elongated; sternite 9 with very broad and deep caudomedian excavation; tergite 9 moderately short, lateral margins parallel on distal  $\frac{1}{2}$ , apicolateral processes short and blunt. Gonocoxite elongated; gonostylus short with pointed tip. Aedeagus with very high basal arch, distomedian process short and pointed, ventrally bent. Parameres (Fig. 2g) each with well-sclerotized, recurved,

basal apodeme; main portion very elongate, slender, and nearly straight; distal portion very attenuated, bent ventrad, ending in slender filament.

Pupa.—Exuviae yellowish. Length about 3 mm. Respiratory horn (Fig. 2h) 3 × as long as greatest breadth, expanded distally; surface with scale-like tubercles; distal portion with double row of 14–15 spiracular openings. Operculum (Fig. 2i) slightly longer than greatest breadth, with rounded anterior margin; central portion with pair of sublateral, circular, raised areas, without *a.m.* setae; surface of posterior margin slightly spiculate, and a few tubercles present between the raised areas. Remaining structures not suitable for description.

Distribution.—U.S.A. (California to Texas, Florida); circum-Caribbean from Mexico to Colombia, Venezuela, Puerto Rico, Haiti, and Jamaica.

Types.—Holotype ♀, allotype ♂, Belize, Nattieville, 8.vii.1968, W. L. Haase, at light. Paratypes, 56 ♀, 54 ♂, as follows: ARIZONA: Coconino Co., Oak Creek at Chavez Crossing, 26.vii.1978, M.W. Sanderson, UV trap, 1 ♂. Yavapai Co., Clarkdale, spring near Josephine Tunnel, 6.x.1980, Sanderson, UV trap, 6 ♂; Oak Creek at Cornville, 10.vi.1977, Sanderson, UV trap, 2 ♂; Fossil Creek, Rte. 708 SE Camp Verde, 3.vi.1981, Sanderson, UV trap, 1 ♂, BELIZE: Same data as types, 3 ♀, 5 ♂; same data except 7–8.vii.1968, black light, 12♀; Mile 15, Western Highway, 9.vii.1968, Haase, black light, 1 ♂; Cayo District, Western Highway MP 66, vi.1969, W. & D. Haase, light trap, 1 ♀; Punta Gorda, 1.5 mi W, 31.vii.1968, Haase, black light, 1 ♀. CALIFORNIA: Death Valley, Saratoga Springs, 30.v.1953, J. N. Belkin, 1 ♀; same, vi–vii.1954, Belkin and McDonald, at light, 1 ♀, 4 ♂, Riverside Co., Blythe, 8.iv.1949, W. W. Wirth, at light, 1 ♂. COLOMBIA: Meta, Pto. Lopez, 7.ix.1971, C. J. Marinkelle, light trap, 1 ♀. COSTA RICA: San Jose, San Isidro del General, 30.vii.1964, 1 ♂; Palmar Sur, ix.1962, F. S. Blanton, 1 ♀. EL SALVADOR: Sonsonata, Armenia, viii–xi.1966. Blanton, 1 ♀; San Vicente, viii.1967, Blanton, 1 ♂. FLORIDA: Dade Co., Kendall, 6.viii.1977, W. W. Wirth, light trap, 1 ♀. HONDURAS: Comayagua, Siguatepeque, viii.1964, Blanton, 3 ♀, 2 ♂; same data except ix.1966, 5 ♀, 5 ♂; same except viii.1967, 1 ♀, 1 ♂; Comayagua, Comayagua, 17.v.1966, J. F. Matta, 1 ♂. Copan, Santa Rosa, 15.vi.1966, Matta, 1 ♀; same except 26.vi.1966, 1 ♂, 28.vi.1966, 1 ♂; 10.vii.1966, 1 ♂; 4.viii.1966, 1 ♂; Santa Rosa, iii–v.1964, Blanton, 1 ♂; same except x.1966, 2 ♀, 4 ♂. Zamorano, Francisco Morazan, 15.vi.1966, Matta, 1 ♀. HAITI: Chou Chou Vaie, 8.vi.1978, C. Raccurt, swept, 2 ♀. JAMAICA: Clarendon Parish, Milk River Bath, 19.xi.1968, R. E. Woodruff, black light, 2 ♀. St. Catherine, Twickenham Park, 28.iv.1970, E. G. Franworth, light trap, 3 ♀. MEXICO: Morelos, El Salto Falls, 17.vi.1969, W. & D. Haase, light trap, 1 ♂. Sinaloa, 20 mi E Villa Union, 31.i.1964, E. I. Schlinger & M. E. Irwin, at light, 1 ♀. PANAMA: Chiriqui, El Volcan, 22.vii.1966, A. Broce, 1 ♀. Darien, Santa Fe, ii–xi.1967, Broce, 2 ♀. Canal Zone, Mojinga Swamp, i.1952, F. S. Blanton, 1 ♀, 4 ♂. PUERTO RICO: Mayaguez, Univ. Puerto Rico Campus, 9.i.1969, Walker & Drummond, light trap, 1 ♂. TEXAS: Gillespie Co., Fredericksburg, 30.vi.1967, Blanton & Borchers, light trap, 1 ♀; Pedernales River, 4.iv.1955, W. W. Wirth, reared stream margin, 1 ♀ with pupal exuviae, Kerr Co., Kerrville, 10–11.viii.1953, L. J. Bottimer, light trap, 4 ♀, 6 ♂. VENEZUELA: Araq. Ocumare, 10.ii.1969, P. Spangler, 1 ♀. Guarico, 12 km S Calabozo, 6.ii.1969, P. & P. Spangler, light trap, 1 ♀. Zulia, El Tucuco, Sierra de Perija, 28.i.1978, J. B. Heppner, 1 ♂.

Discussion.—Among the Neotropical species with 2-spotted wings, *Alluaudo-*



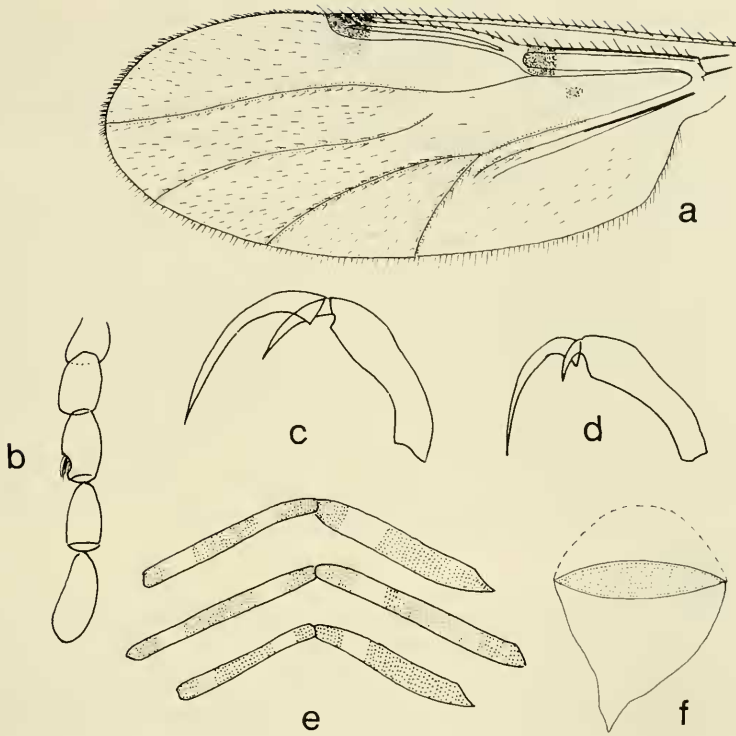


Fig. 3. *Alluaudomyia catarinensis*, female: a, wing; b, palpus; c, claws of fore and mid legs; d, claws of hind leg; e, femora and tibiae of (top to bottom) hind, mid and fore legs; f, spermatheca.

*myia caribbeana* resembles *A. schnacki* in the presence of subapical pale rings on the tibiae, but differs from that species in having the bases of all femora brown. It also differs from *A. schnacki* in the high arch of the male aedeagus.

*Alluaudomyia wirthi* Williams (1956) from Douglas Lake, Michigan, is very similar to *A. caribbeana* but differs in having 3 additional black streaks on the wing: a distinct one near the base of vein M2, an indistinct one toward the base of cell M2, and another at the tip of the anal vein. The genitalia of the unique holotype male of *A. wirthi* are mounted with the aedeagus folded back on itself, but the basal arch is apparently much shorter than in *A. caribbeana*.

The pupa of *Alluaudomyia caribbeana* differs from that of *A. bella* (Coquillett) by the small number of spiracular openings on the respiratory horn, and by the absence of microsetae in the midportion of the raised areas of the operculum. It differs from the pupa of *A. schnacki* Spinelli by the small number of spiracular openings of the respiratory horn, and by the scale-like tubercles on the surface of the horn; in addition the pupa of *A. schnacki* lacks the large raised areas on the operculum, but there are 2 small *a.m.* setae on each of these areas instead.

***Alluaudomyia catarinensis* Spinelli and Wirth, NEW SPECIES**

Fig. 3

Female.—Wing length 1.35 (1.30–1.40,  $n = 2$ ) mm; breadth 0.58 (0.56–0.60,  $n = 2$ ) mm.

*Head:* Brownish. Eyes bare, contiguous for a distance equal to diameter of 2 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; lengths of flagellar segments in proportion of 25-20-18-19-20-20-22-22-25-27-30-30-40; antennal ratio 0.91 ( $n = 2$ ). Palpus (Fig. 3b) brownish; lengths of segments in proportion of 15-20-20-15-25; 3rd segment with conspicuous distal pit bearing long hyaline sensilla. Mandible with 16 teeth.

*Thorax:* Uniformly brownish, very pilose; scutellum with 4 setae. Legs (Fig. 3e) brownish, with subapical pale rings on femora and tibiae, and subbasally on tibiae; tarsi brownish; hind tarsal ratio 2.87 (2.84–2.90,  $n = 2$ ); claws (Fig. 3c, d) long, slender and greatly unequal on all legs, but short claw very much reduced on hind leg. Wing (Fig. 3a) gray, markedly infuscated along veins; 2 extensive conspicuous dark-brownish spots, one proximad of r-m crossvein between radius and media, the other covering end of costa and extending posteriorly across cell R5 over  $\frac{1}{2}$  way to vein M1; costal ratio 0.62 ( $n = 2$ ). Halter pale.

*Abdomen:* Dark brown, last segment yellowish; genital sclerotization not pigmented. One spermatheca (Fig. 3f), collapsed and not measured in specimens examined, but appearing ovoid with tapering neck.

Male.—Unknown.

Distribution.—Brazil.

Types.—Holotype ♀, Brazil, Santa Catarina, Nova Teutonia, x.1967, F. Plau-mann. Paratype, 1 ♀, same data except xi.1970.

Discussion.—This species is readily distinguished from the other Neotropical species of *Alluaudomyia* with 2-spotted wings by its large size (shared with *A. plaumanni*) and dark, pale-banded legs.

### *Alluaudomyia distispinulosa* Spinelli and Wirth, NEW SPECIES

Fig. 4

Female.—Wing length 1.10 (1.05–1.15,  $n = 2$ ) mm; breadth 0.48 (0.47–0.49,  $n = 2$ ) mm.

*Head:* Brownish. Eyes bare, contiguous for a distance equal to diameter of 3 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; lengths of flagellar segments in proportion of 25-18-17-18-20-20-22-23-27-27-28-25-39; antennal ratio 0.89. Palpus (Fig. 4b) with lengths of segments in proportion of 12-15-16-13-25; 3rd segment with conspicuous distal pit. Mandible with 16 teeth.

*Thorax:* Brownish, with small dark mottlings; scutellum paler than mesonotum and postnotum. Legs (Fig. 4d) yellowish, coxae and trochanters dark brown; femora dark brown on proximal  $\frac{1}{2}$ , with subapical pale ring on fore and mid legs; mid tibia with 4 narrow, equally separated, incomplete brown rings; fore tibia with subbasal and subapical pale ring; mid and hind tibiae brown at extreme base and apex, with narrow, equally separated, incomplete brown rings, 4–5 on mid tibia, 5–6 on hind tibia; tarsi brownish; hind tarsal ratio 3.3; claws (Fig. 4c) long and slender, unequal on all legs. Wing (Fig. 4a) with costal ratio 0.60 (0.58–0.62,  $n = 2$ ); membrane whitish; 2 black spots, 1 proximad of r-m crossvein, the other over end of costa and extending into cell R5. Halter pale.

*Abdomen:* Pale brown, genital sclerotization not in position to study. One ovoid spermatheca (Fig. 4e) measuring 0.090 mm long  $\times$  0.055 mm broad.

Male.—Wing length 0.85 mm; breadth 0.34 mm. Similar to female with usual

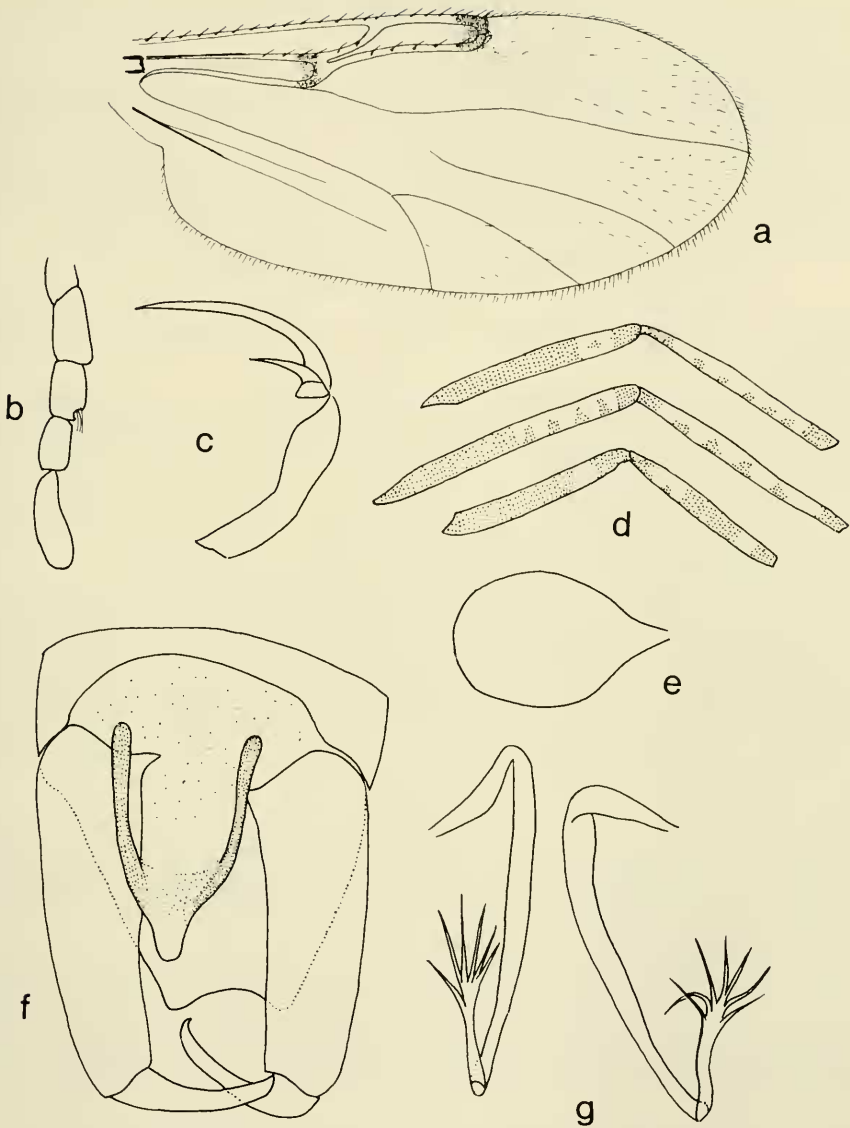


Fig. 4. *Alluaudomyia distispinulosa*; a-e, female; f-g, male; male: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genitalia; g, parameres.

sexual differences. Antenna missing. Palpal segments with lengths in proportion of 8-18-16-14-26. Hind tarsal ratio 2.85. Costal ratio 0.50.

*Genitalia* (Fig. 4f): Learly identical with those of *A. punctiradialis*, but caudal membrane of sternite 9 spiculate; gonostylus without distinct apical tooth, and paramere (Fig. 4g) with spinules in a more compact group at tip.

*Distribution*.—Brazil, Colombia, Venezuela.

*Types*.—Holotype ♀, Brazil, Amazonas, Manaus, 21.ix.1969, H. A. Wright. Allotype ♂, Venezuela, Guarico, 12 km S Calabozo, 6.ii.1969, P. & P. Spangler,

light trap. Paratype, COLOMBIA: Rio Raposo, iv.1964, V. H. Lee, light trap, 1 ♀.

Discussion.—The species takes its name from its distally spinulose male parameres, a character it shares with *A. punctiradialis* n. sp. The Oriental species of the *A. annulata* Group (Wirth and Delfinado, 1964) are also characterized by many narrow dark rings and punctations on the legs, and small dark punctures on the radius, but the Oriental species differ in having 7 additional posterior spots on the wings and parameres without the distal clump of sharp spinules.

*Alluaudomyia estevezae* Spinelli and Wirth, NEW SPECIES

Fig. 5

Female.—Wing length 1.00 (0.95–1.05, n = 5) mm; breadth 0.45 (0.42–0.50, n = 5) mm.

*Head*: Brownish. Eyes bare, contiguous for a distance equal to diameter of 2 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; flagellar segments with lengths in proportion of 28–16–16–17–17–18–18–20–22–22–25–23–31; antennal ratio 0.80 (0.78–0.82, n = 5). Palpus with lengths of segments in proportion of 12–15–20–15–25, last 3 segments darker than preceding 2; 3rd segment with 1 or 2 distal sensilla. Mandible with 15 teeth.

*Thorax*: Brownish with dark-brown mottlings; scutellum paler. Legs (Fig. 5e) brownish, with pale rings subapically on femora, subbasally and subapically on tibiae; tarsi pale brown; hind tarsal ratio 2.79 (2.60–3.00, n = 5); tarsal claws (Fig. 5c, d) moderately short and stout, unequal on all legs. Wing (Fig. 5a) with costal ratio 0.60 (n = 5); membrane whitish, with 12–13 black spots: 1 at end of costa extending into cell R5, 2nd proximad of r-m crossvein; 4 subapically in cells R5, M1, M2, and M4, 3 in anal cell, 1 on vein M1 + 2, 1 on vein M2, and 1 in cell M2 just above mediocubital fork. Halter pale.

*Abdomen*: Brownish, last segment whitish. Genital sclerotization (Fig. 5f) prominent, deeply sclerotized brownish, as figured. One subspherical spermatheca (Fig. 5g) with conical sclerotized neck, measuring 0.069 (0.067–0.072, n = 3) mm long × 0.057 (0.055–0.060, n = 3) mm broad.

Male.—Wing length 0.70 mm, breadth 0.32 mm; costal ratio 0.52. Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 42–18–18–17–14–13–12–13–13–14–34–30–36; antennal ratio 0.86. Palpal segments with lengths in proportion of 10–17–15–14–19. Hind tarsal ratio 2.3.

*Genitalia* (Fig. 5h): Elongated; sternite 9 short with deep, broad, U-shaped, caudomedian excavation, posterior membrane spiculate; tergite 9 short, tapering to long, narrowly pointed, apicolateral processes. Gonocoxite long and slender, ca. 4 × longer than wide; gonostylus slender and curved. Aedeagus slightly longer than basal breadth, with high basal arch. Parameres (Fig. 5i) divergent caudad; each with short recurved basal apodeme; main portion moderately stout and sclerotized anteriorly, distal portion tapering, abruptly recurved ventrad, and tapering to slender sharp point.

Distribution.—El Salvador, Honduras, Mexico.

Types.—Holotype ♀, Mexico, Morelos, El Salto Falls, 17.vi.1969, W. & D. Haase, light trap. Allotype ♂, El Salvador, San Vicente, Santo Domingo, xi.1966, F. S. Blanton. Paratypes, 5 ♀, as follows: MEXICO, same data as holotype, 4 ♀. HONDURAS: Santa Rosa, iii–v.1964, F. S. Blanton, 1 ♀.

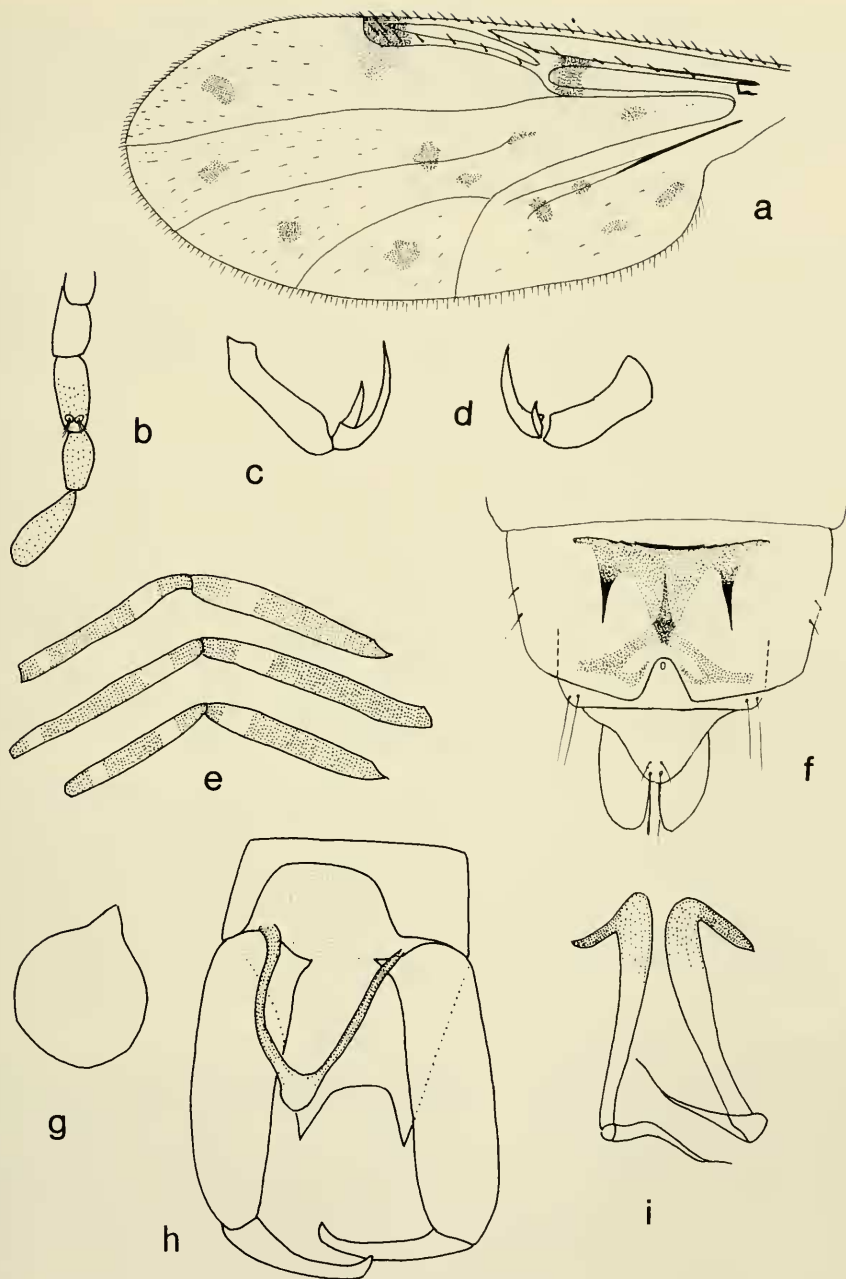


Fig. 5. *Alluaudomyia estevezae*; a-g, female; h-i, male: a, wing; b, palpus; c, claws of fore and mid legs; d, claws of hind leg; e, femora and tibiae of (top to bottom) hind, mid, and fore legs; f, genital sclerotization; g, spermatheca; h, genitalia; i, parameres.

Discussion.—The species is named for Lic. Ana L. Estevez of the Instituto de Limnología de La Plata (ILPLA), República Argentina.

*Alluaudomyia estevezae* is similar to *A. bella* (Coquillett) in wing pattern, but consistently has 3 rather than 1 pale spots in the anal cell and 2 pale spots in the

proximal  $\frac{1}{2}$  of cell M2 in line with the pale spot over the base of vein M2, the legs are dark brown with narrow pale bands, the spermatheca has a conical tapering neck, and the genital sclerotization is dark brown with 3 narrowly pointed posterior extensions. The male aedeagus and parameres of the 2 species also differ markedly.

*Alluaudomyia fittkai* Spinelli and Wirth, NEW SPECIES

Fig. 6

Female.—Wing length 0.85 (n = 7) mm; breadth 0.35 (n = 7) mm.

*Head*: Yellowish brown. Eyes bare, contiguous for a distance equal to diameter of 3 ommatidial facets. Antenna with lengths of flagellar segments in proportion of 17-12-12-13-14-15-18-19-19-21-26-23-32; antennal ratio 1.02 (1.00–1.07, n = 7). Palpus (Fig. 6b) with lengths of segments in proportion of 9-12-12-10-17; 3rd segment with sensory pit. Mandible with 11–12 teeth.

*Thorax*: Yellowish brown; scutellum with 2 setae. Legs (Fig. 6d) yellowish brown, with pale rings subapically on all femora and subbasally on fore and mid tibiae; hind tibia pale except narrow median and apical rings brown; tarsi pale brown except hind basitarsus dark brown; hind tarsal ratio 3.04 (2.96–3.12, n = 7). Tarsal claws (Fig. 6c) large and slender, unequal on all legs. Wing (Fig. 6a) with costal ratio 0.60 (n = 7); membrane whitish; 4 small black spots, one proximal of r-m crossvein, 2nd at end of costa extending into cell R5, 3rd lying near base of vein M2, and 4th near tip of vein Cu1. Halter pale.

*Abdomen*: Yellowish brown; genital sclerotization not pigmented. One pear-shaped spermatheca (Fig. 6e) measuring 0.057 (0.055–0.068, n = 7) mm long  $\times$  0.046 (0.045–0.051, n = 7) mm broad.

Male.—Wing length 0.72 (0.70–0.78, n = 3) mm; breadth 0.31 (0.30, n = 3) mm; costal ratio 0.51 (0.50–0.52, n = 3). Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 42-18-18-18-18-17-17-16-16-25-46-41-39; antennal ratio 1.00 (0.98–1.03, n = 4). Palpus with lengths of segments in proportion of 8-13-14-10-15. Hind tarsal ratio 2.6 (2.43–2.71, n = 4).

*Genitalia* (Fig. 6f, g): Indistinguishable from those of *Alluaudomyia leei* (Fig. 7g, h).

Distribution.—Brazil, Ecuador.

Types.—Holotype ♀, allotype ♂, Brazil, Amazonas, Cachoeira San Antonio, 10.i.1963, E. J. Fittkau, at light. Paratypes, 229 ♀, 25 ♂, as follows: BRAZIL: Same data as types, 18 ♀; Amazonas, Rio Cueiras, iv.1961, Fittkau, at light, 2 ♀, 2 ♂; same data except 19.i.1961, 1 ♀, 1 ♂; Rio Cururu, Mission Cururu, i.1961, Fittkau, at light, 5 ♂; Rio Irapirapi, Cachoeira, 11.i.1963, Fittkau, at light, 34 ♀; same data except 13.i.1963, 2 ♀; Rio Marauia, xii-1962-ii.1963, Fittkau, at light, 78 ♀, 1 ♂; same data except 7.i.1963, 15 ♀; same data except 22.i.1963, sandy beach, 6 ♀; same data except 24.i.1963, near foothills, 8 ♀, 1 ♂; same data except i-ii.1963, 17 ♀, 1 ♂. Para, Rio Paru, 14.iii-22.iv.1962, Fittkau, 16 ♀, 2 ♂; same data except iii.1962, 3 ♀, 1 ♂; same data except iv.1962, 7 ♀. ECUADOR: Pastaza, Cononaco, 30.v.1976, J. Cohen, at light, 22 ♀, 11 ♂.

Discussion.—This species is named for Ernst J. Fittkau of the Zoologische Staatssammlung, München, West Germany, in recognition of his important contributions in the collection and study of Amazonian midges.

*Alluaudomyia fittkai* belongs to a large group of species related to the North

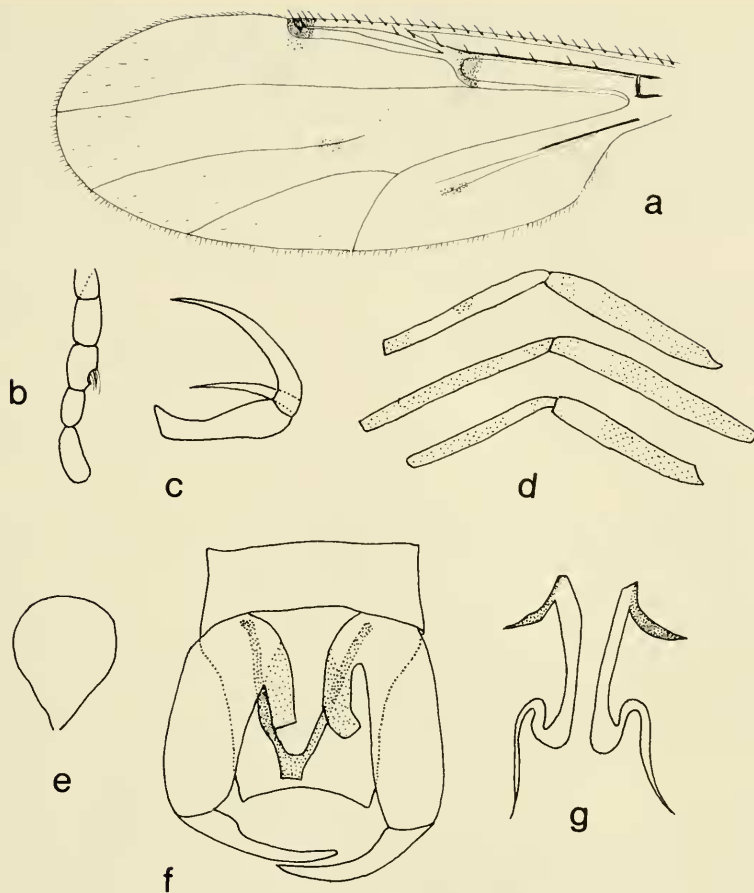


Fig. 6. *Alluaudomyia fittkai*; a-e, female; f-g, male: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genitalia; g, parameres.

American *A. megaparamera* Williams in which the marginal wing spots are few in number and the male parameres consist of a nearly straight proximal portion, abruptly swollen and reflexed in mid portion, and ending in a long, tapering, curved, pointed process. *A. megaparamera* is readily distinguished from *fittkai* by the presence of 2 distinct anterior black spots and 7 indistinct black streaks posteriorly, more extensive pale leg markings, more elongate spermatheca, and more prominent and differently shaped genital sclerotization.

#### *Alluaudomyia leei* Spinelli and Wirth, NEW SPECIES

Fig. 7

Female.—Wing length 1.12 (1.05–1.20,  $n = 6$ ) mm; breadth 0.48 (0.45–0.50,  $n = 6$ ) mm.

*Head*: Dark brown. Eyes bare, contiguous for a distance equal to diameter of 1.5 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; lengths of flagellar segments in proportion of 28-20-20-20-23-23-25-25-29-29-30-26-35; antennal ratio 0.86 (0.81–0.92,  $n = 8$ ). Palpus (Fig. 7b) with lengths of segments

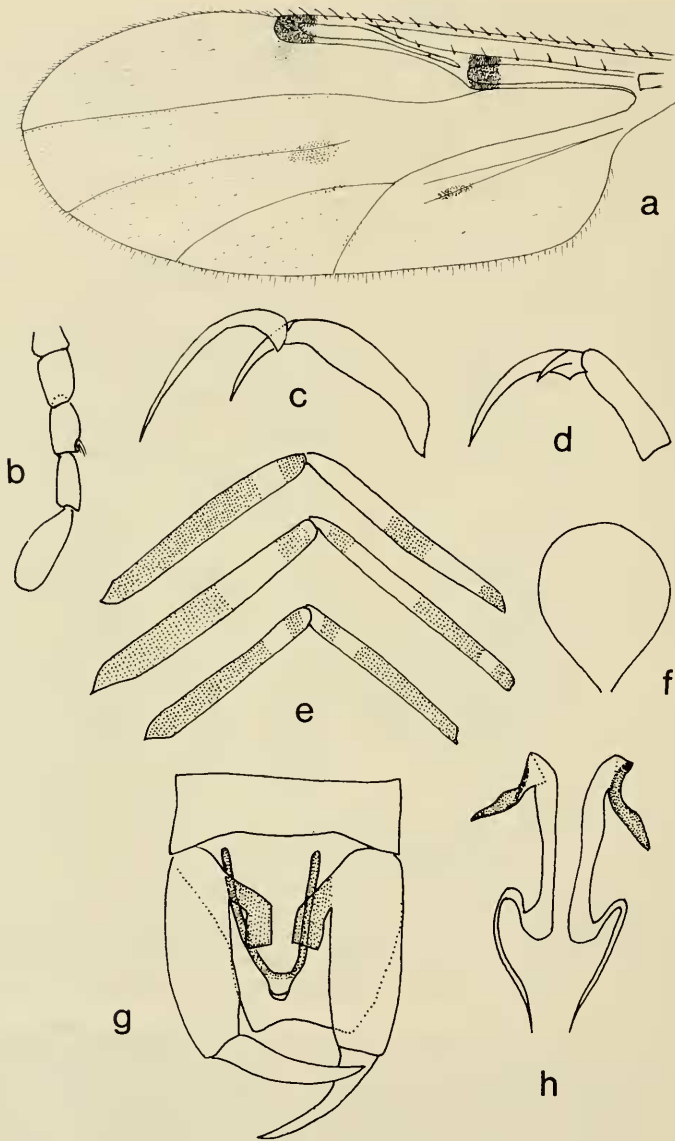


Fig. 7. *Alluaudomyia leei*; a-f, female; g-h, male: a, wing; b, palpus; c, claws of fore and mid legs; d, claws of hind leg; e, femora and tibiae of (top to bottom) hind, mid and fore legs; f, spermatheca; g, genitalia; h, parameres.

in proportion of 12-15-17-15-23; 3rd segment with sensory pit. Mandible with 13 teeth.

*Thorax*: Brownish, with dark brown mottlings. Legs (Fig. 7e) brownish; coxae and trochanters brown; femora and fore and mid tibiae with subapical pale rings; tibiae pale at bases, fore and mid tibiae with subbasal pale rings; tarsi light brown except hind basitarsus dark brown; hind tarsal ratio 2.75 (2.50-2.94,  $n = 7$ ); tarsal claws (Fig. 7c, d) large and slender, unequal on all legs, the longer nearly as long



as tarsomere 5, but short claw very much reduced on hind leg. Wing (Fig. 7a) with costal ratio 0.60 (0.58–0.63,  $n = 6$ ); membrane whitish, faint dark streaks along veins; 4 black spots, one proximad of r-m crossvein extending from costa to media, 2nd at end of costa and extending in cell R5 about  $\frac{1}{2}$  way to vein M1, 3rd lying near base of vein M2, and 4th near tip of vein Cu1. Halter pale.

*Abdomen*: Brownish; genital sclerotization not pigmented. One subspherical spermatheca (Fig. 7f) with short neck, measuring 0.076 (0.075–0.080,  $n = 5$ ) mm long  $\times$  0.060 (0.055–0.070,  $n = 5$ ) mm broad.

*Male*.—Wing length 0.82 (0.75–0.85,  $n = 3$ ) mm; breadth 0.31 (0.30–0.32,  $n = 3$ ) mm; costal ratio 0.52 (0.50–0.56,  $n = 3$ ). Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 48-18-18-16-18-14-14-14-14-26-46-38-40; antennal ratio 0.99 (0.97–1.02,  $n = 3$ ). Hind tarsal ratio 2.5 ( $n = 3$ ).

*Genitalia* (Fig. 7g): Short; sternite 9 broad, without caudomedian excavation; tergite 9 elongate, tapering distally with apicolateral processes reduced to obtuse angles. Gonocoxite moderately long, bearing an anteromesal subrectangular process projecting posteriorly; gonostylus slender, curved to pointed tip. Aedeagus longer than basal breadth; basal arch extending nearly to apex; distomedian process a short, ventrally bent point. Parameres (Fig. 7h) separate, nearly identical with those described by Wirth and Grogan (1981) for the Nearctic species *A. megaparamera* Williams; each with slender, recurved, and heavily sclerotized basal apodeme; straight and slender on proximal  $\frac{1}{2}$  of main portion, then abruptly swollen bulbously, abruptly recurved basad ventrolaterally, and less abruptly curved laterally and distally as a long, slender, tapering, pointed process.

*Distribution*.—Bolivia, Colombia.

*Types*.—Holotype ♀, Colombia, Meta, Finca Barbascal, 27–30.iv.1964, V. H. Lee, light trap. Allotype ♂, Colombia, Meta, Refugio Macarena, 10.i.1966, C. J. Marinkelle, light trap. Paratypes, 15 ♀, 3 ♂, as follows: BOLIVIA: Santa Cruz Pr., San Esteban Mayurina, 2–5.x.1959, R. E. Cummings, light trap, 4 ♀; Santa Cruz, Saavedra Agr. Exp. Sta., 3.i.1960, Cummings, light trap, 2 ♀; Santa Cruz, 2.i.1960, Cummings, 3 ♀. COLOMBIA: 6 ♀, 3 ♂, same data as holotype.

*Discussion*.—This species is named for Vernon H. Lee, who while a member of a Rockefeller arbovirus research team in Cali, Colombia, made extensive collections of Ceratopogonidae for the U.S. National Museum. *Alluaudomyia leei* differs from *A. fittkau* and *amazonica*, the other 2 Neotropical species with 4–5 black wing spots, by the brown bases of all femora, and the presence of black streaks near the apices of veins M1, M2, M3 + 4, and Cu1. The male gonostyli of *A. leei* bear a strongly sclerotized mesal process at the base similar to that found in *A. fittkau* (Fig. 6f), but lacking in *A. amazonica* (Fig. 1g).

### *Alluaudomyia nubeculosa* Spinelli and Wirth, NEW SPECIES

Fig. 8

*Female*.—Wing length 0.90 (0.85–0.95,  $n = 6$ ) mm; breadth 0.38 (0.35–0.40,  $n = 6$ ) mm.

*Head*: Uniformly pale brown. Eyes bare, narrowly contiguous, about the distance of the diameter of 1 ommatidial facet. Antenna with lengths of flagellar segments in proportion of 20-15-15-16-18-18-20-20-24-24-28-26-34; antennal ratio 1.03 (0.96–1.10,  $n = 6$ ). Palpus (Fig. 8b) with lengths of segments in pro-

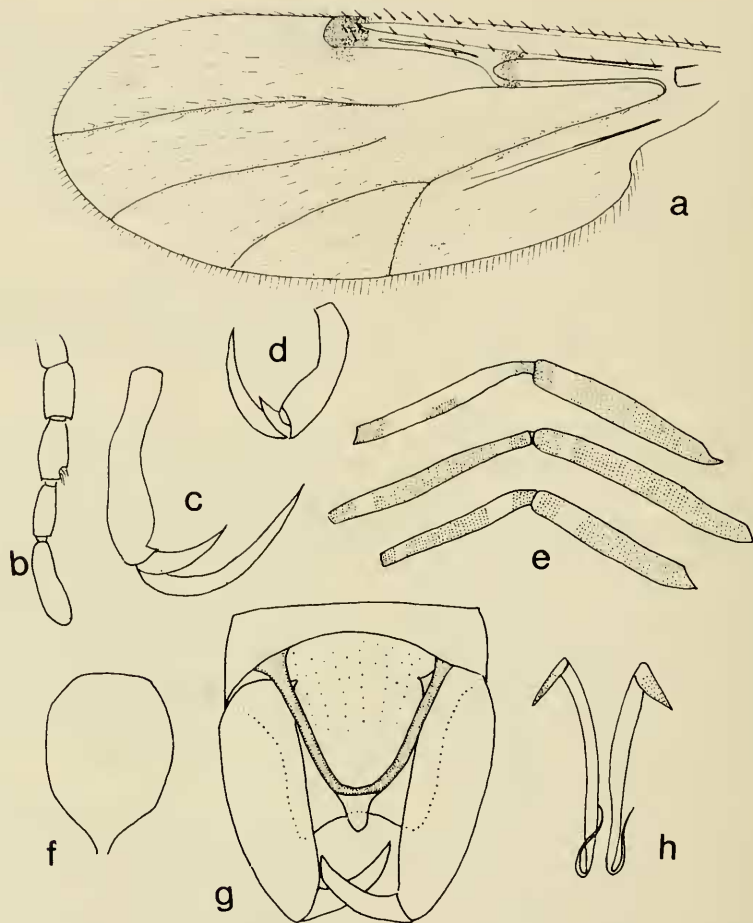


Fig. 8. *Alluaudomyia nubeculosa*; a-f, female; g-h, male; a, wing; b, palpus; c, claws of fore and mid legs; d, claws of hind leg; e, femora and tibiae of (top to bottom) hind, mid and fore legs; f, spermatheca; g, genitalia; h, parameres.

portion of 10-14-17-14-23; 3rd segment with distal sensory pit. Mandible with 14 teeth.

**Thorax:** Brownish; scutellum paler, bearing 4 central setae. Legs (Fig. 8e) brownish, with pale rings subapically on femora, subbasally and subapically on fore and mid tibiae; hind tibia with broad central pale band bearing a faint brownish ventral area in midportion; tarsi brownish except 4 distal tarsomeres on hind leg pale; hind tarsal ratio 3.52 (3.33-3.70,  $n = 6$ ); claws (Fig. 8c, d) very unequal, the longer nearly as long as tarsomere 5, but short claw much reduced on hind leg. Wing (Fig. 8a) with costal ratio 0.55 (0.53-0.56,  $n = 6$ ); membrane milky but infuscated along veins; 2 black spots, 1 proximad of r-m crossvein, 2nd at the end of costa and extending into cell R5; 10 fainter, cloudy markings, 2 each (1 at wing margin and 1 subapically) in cells R5, M1, M2, M4, and anal cell macrotrichia conspicuously long and dense. Halter pale with infuscated knob.

**Abdomen:** Pale brown; genital sclerotization a short median rodlike pigmented

sclerite. One ovoid spermatheca (Fig. 8f) measuring 0.088 (0.085–0.090,  $n = 5$ ) mm long  $\times$  0.059 (0.058–0.060,  $n = 5$ ) mm broad, with short slender neck.

Male.—Wing length 0.70 ( $n = 4$ ) mm; breadth 0.26 ( $n = 4$ ) mm; costal ratio 0.50 ( $n = 4$ ). Similar to female with usual sexual differences, wing pattern without distal markings. Antenna with lengths of flagellar segments in proportion of 48-16-16-15-15-14-14-15-16-20-44-36-37; antennal ratio 1.03 (1.00–1.08,  $n = 4$ ). Palpus with lengths of segments in proportion of 8-16-14-14-20. Hind tarsal ratio 2.85 ( $n = 4$ ).

*Genitalia* (Fig. 8g): Short; sternite 9 with low caudomedian excavation, posterior membrane spiculate; tergite 9 progressively narrowing distad, with 2 very short apicolateral processes. Gonocoxite short; gonostylus slender, curved. Aedeagus about as long as basal breadth, basal arch very high, distomedian process short. Parameres (Fig. 8h) each with well-developed basal apodeme; main portion slender, nearly straight and not well sclerotized, curving ventrad to simple, sharp, filamentous tip.

Distribution.—Brazil, Colombia.

Types.—Holotype ♀, allotype ♂, Brazil, Amazonas, Rio Solimões, 15.ix.1961, E. J. Fittkau, at light. Paratypes, 6 ♀, 3 ♂, as follows: BRAZIL: Same data as types, 2 ♀, 2 ♂; same data except 31.viii.1961, 1 ♀; Amazonas, Rio Madeira, Parana Madeirinha, 10.ix.1960, Fittkau, at light, 1 ♀. Para, Belem, ii.1970, T. H. G. Aitken, light trap, 1 ♀; same data except xi.1970, 1 ♂. COLOMBIA: Valle, Rio Raposo, iv.1963, V. H. Lee, light trap, 1 ♀.

Discussion—*Alluaudomyia nubeculosa* differs markedly in wing pattern from all other Neotropical species by the presence of a pair of cloudy markings one at wing margin and the other submarginally, in each of cells R5, M1, M2, M4, and CuA1.

### *Alluaudomyia plaumanni* Spinelli and Wirth, NEW SPECIES

Fig. 9

Female.—Wing length 1.3 mm; breadth 0.55 mm.

*Head*: Dark brown. Eyes bare, contiguous for a distance equal to diameter of 2 ommatidial facets. Antenna uniformly dark brown; flagellar segments with lengths in proportion of 25-17-15-15-17-18-18-19-25-30-34-34-42; antennal ratio 1.15. Palpus (Fig. 9b) brown; lengths of segments in proportion of 15-18-18-15-25; 3rd segment with conspicuous distal pit. Mandible with 14 teeth.

*Thorax*: Uniformly dark brown; scutellum with 4 setae, 2 in midportion and 1 on each side. Legs (Fig. 9f) uniformly dark brown; hind tarsal ratio 3.0; tarsal claws (Fig. 9c, d, e) long and slender, subequal on fore leg, unequal on mid and hind legs. Wing (Fig. 9a) with costal ratio 0.58; membrane gray, infuscated along veins; 2 large black spots: 1 proximad of r-m crossvein between radius and media extending into cell M2, the other broadly covering end of costa and extending into cell R5. Halter deeply infuscated.

*Abdomen*: Same coloration as thorax. Genital sclerotization not in position to describe. One pear-shaped spermatheca (Fig. 9g) measuring 0.090 mm long  $\times$  0.070 mm broad.

Male.—Unknown.

Distribution.—Brazil.

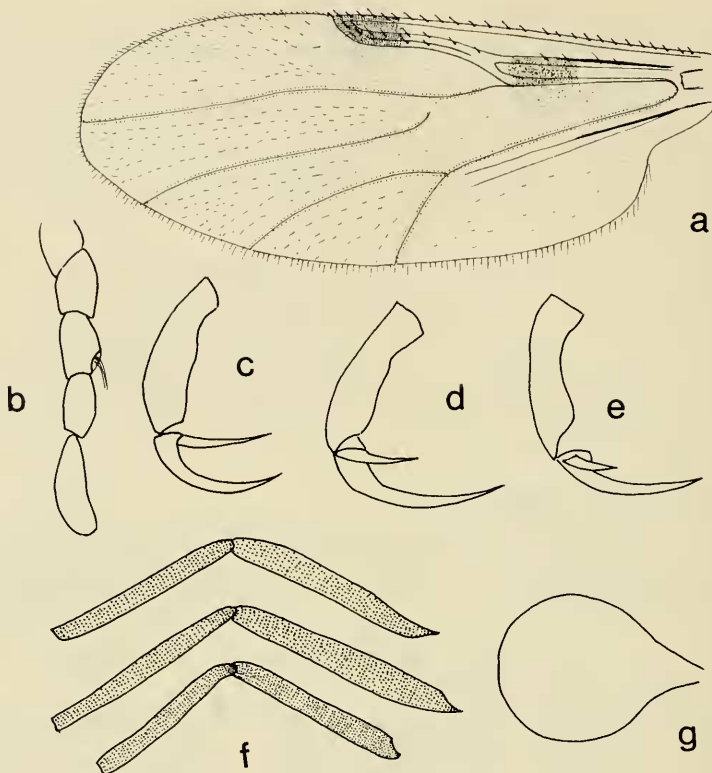


Fig. 9. *Alluaudomyia plaumanni*, female: a, wing; b, palpus; claws of c, fore; d, mid; and e, hind legs; f, femora and tibiae of (top to bottom) hind, mid and fore legs; g, spermatheca.

Type.—Holotype ♀, Brazil, Santa Catarina, Nova Teutonia, viii.1963, F. Plaumann.

Discussion.—This species is named for Fritz Plaumann, whose half century of collecting in Santa Catarina has added so much to our knowledge of the Brazilian insect fauna. *A. plaumanni* is readily distinguished from the other Neotropical *Alluaudomyia* with 2-spotted wings by its large size and uniformly dark brown body and legs.

#### *Alluaudomyia prima* Clastrier

*Alluaudomyia prima* Clastrier, 1976: 205 (female; French Guiana; figs.; holotype in Paris Mus.).

Distribution.—Holotype ♀ from French Guiana, Haut Maroni, Maripasoula.

New record.—PANAMA: Canal Zone, Mojinga Swamp, i.1952, F. S. Blanton, 1 ♀.

#### *Alluaudomyia punctiradialis* Spinelli and Wirth, NEW SPECIES

Fig. 10

Female.—Wing length 1.08 (1.00–1.10,  $n = 5$ ) mm; breadth 0.49 (0.46–0.50,  $n = 5$ ) mm.

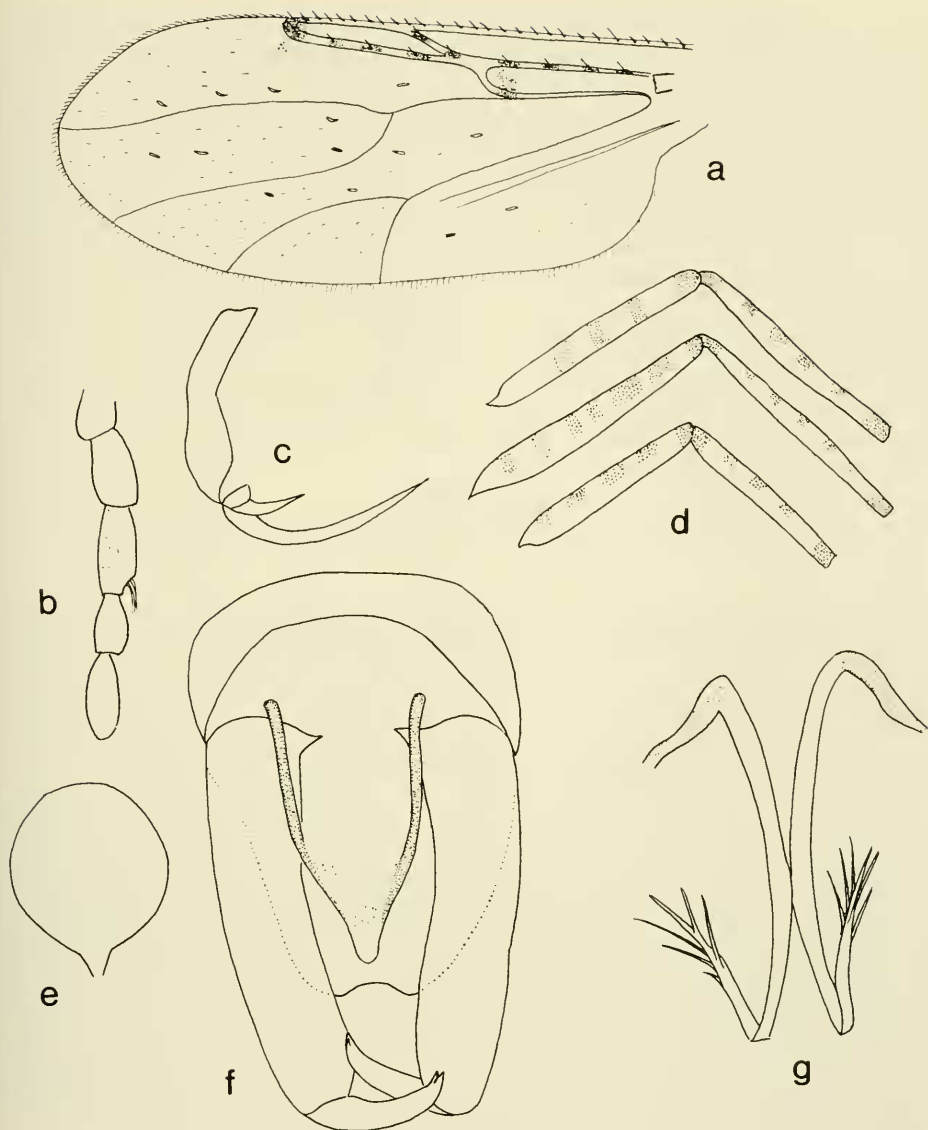


Fig. 10. *Alluaudomyia punctiradialis*; a-e, female; f-g, male: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genitalia; g, parameres.

**Head:** Dark brown. Eyes bare, contiguous for a distance equal to diameter of 3 ommatidial facets. Antenna dark brown, bases of segments 3-10 pale; lengths of flagellar segments in proportion of 28-18-18-20-22-22-22-23-28-30-29-29-34; antennal ratio 0.87 ( $n = 3$ ). Palpus (Fig. 10b) with lengths of segments in proportion of 13-20-20-16-25; 3rd segment with distal sensory pit and darker than others. Mandible with 14-15 subequal teeth.

**Thorax:** Dark brown, with small dark mottlings; scutellum with pale and dark bands alternately arranged. Legs (Fig. 10d) yellowish, with many narrow dark brown rings and punctations, coxae and trochanters brownish. Fore leg femur

with 3–4 incomplete brown rings and brown apex, tibia brown at extreme base and apex, with 3 narrow, equally separated, incomplete brown rings in midportion, tarsus brownish, basitarsus infuscated at base and apex, tarsomere 2 infuscated at apex. On mid leg femur with 5–6 incomplete brown rings, apex brown; tibia brown at extreme base and apex and with 5 narrow, equally separated, incomplete brown rings; tarsus brownish, basitarsus infuscated at base, apex, and midportion; tarsomere 2 infuscated at apex. On hind leg femur with 3 complete brown rings and brown apex; tibia brown at extreme base and apex, and with 4 incomplete brown rings; tarsus brownish, basitarsus infuscated at apex; hind tarsal ratio 3.5 (3.38–3.60,  $n = 4$ ). Tarsal claws (Fig. 10c) long and slender, unequal on all legs. Wing (Fig. 10a) with costal ratio 0.64 (0.63–0.67,  $n = 5$ ); membrane milky white, infuscated along veins; 2 black spots, 1 proximad of r-m crossvein, the other over end of costa and extending into cell R5; 10 small brown punctures along radius; macrotrichia flattened into long narrow scales, mostly white but a few scattered ones are dark brown. Halter infuscated.

*Abdomen*: Dark brown, last segment white; genital sclerotization not pigmented. One subspherical spermatheca (Fig. 10e), measuring 0.085 mm long  $\times$  0.068 mm broad.

Male.—Wing length 0.80 (0.75–0.85,  $n = 4$ ) mm; breadth 0.33 (0.31–0.35,  $n = 4$ ) mm; costal ratio 0.56 (0.52–0.56,  $n = 4$ ). Similar to female with usual sexual differences. Antenna pale brown, segments 14, 15, and base of 13 dark brown; flagellar segments with lengths in proportion of 58-19-19-19-19-17-17-17-20-30-54-40-44; antennal ratio 1.00 ( $n = 4$ ). Palpus dark brown; lengths of segments in proportion of 12-17-17-12-22. Wing with the usual 2 black spots; radius with 4–5 small brown punctures. Hind tarsal ratio 2.95 (2.80–3.00,  $n = 3$ ).

*Genitalia* (Fig. 10f): Elongated; sternite 9 with broad and deep caudomedian excavation, posterior membrane not spiculate; tergite 9 without well-developed apicolateral processes. Gonocoxite long and slender; gonostylus short with distinct apical tooth. Aedeagus with high basal arch, basal arms slender, distal process slender and simple. Parameres (Fig. 10g) each with well-developed, recurved, basal apodeme; main portion elongated and slightly curved, distal portion abruptly recurved ventrad and bearing numerous spinules on distal  $\frac{1}{2}$ .

Distribution.—Brazil.

Types.—Holotype female, Brazil, Para, Belem. ii.1970, T. H. G. Aitken, APWG Forest, light trap. Allotype male, same data except xi.1970. Paratypes, 5 females, 25 males, same data except dates iv.viii.ix.1970.

Discussion.—This species is unique among the known Neotropical species in the presence of many small punctations along the length of the radius. The male of *A. distispinulosa* has parameres (Fig. 4g) very similar to those of *punctiradialis*, but *distispinulosa* lacks the punctations along the radius and its femora are uniformly dark on the proximal halves (Fig. 4).

### *Alluaudomyia schnacki* Spinelli

Fig. 14k

*Alluaudomyia schnacki* Spinelli, in press (all stages; figs.; Argentina; holotype in Mus. de La Plata).

Distribution.—Argentina.

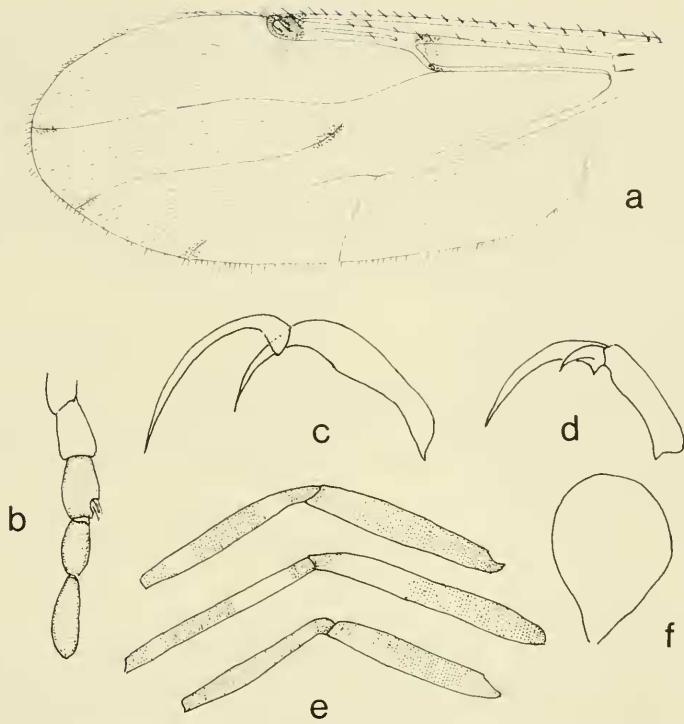


Fig. 11. *Alluaudomyia sexpunctata*, female: a, wing; b, palpus; c, claws of fore and mid legs; d, claws of hind leg; e, femora and tibiae of (top to bottom) hind, mid and fore legs; f, spermatheca.

Comment.—The original description gave all details necessary for comparison with the Neotropical species reported herein except for the details of the female genital sclerotization, which are illustrated in Fig. 14k. The species is known only from the type series collected by Spinelli 5.xi.1979, at Los Talas, Partido de Berisso, Buenos Aires Prov., Rep. Argentina. Adults were reared from larvae and pupae found associated with floating aquatic vegetation (*Azolla filiculoides*) forming the “pleuston community.”

***Alluaudomyia sexpunctata* Spinelli and Wirth, NEW SPECIES**

Fig. 11

Female.—Wing length 0.92 (0.90–0.95, n = 3) mm; breadth 0.37 (0.35–0.40, n = 3) mm.

*Head*: Uniformly pale brown. Eyes bare, contiguous for a distance equal to diameter of 1 ommatidial facet. Antenna with lengths of flagellar segments in proportion of 25-18-18-20-22-22-24-24-26-30-34-32-40; antennal ratio 0.85 (0.78–0.93, n = 2). Palpus (Fig. 11b) with lengths of segments in proportion of 10-15-17-14-22; last 3 segments darker than other 2; 3rd segment with distal pit bearing a long hyaline sensillum. Mandible with 17 teeth.

*Thorax*: Light brown, with dark brown mottlings. Legs (Fig. 11e) brownish; coxae and trochanters brown; pale rings subapically on femora, subbasally on tibiae, and subapically on mid and hind tibiae; tarsi brownish except 4 distal

tarsomeres pale on hind legs; hind tarsal ratio 3.3 ( $n = 2$ ). Claws (Fig. 11c, d) long and slender, unequal, the longer nearly as long as tarsomere 5, but shorter claw much reduced on hind leg. Wing (Fig. 11a) with costal ratio 0.61 (0.58–0.62,  $n = 3$ ); membrane whitish; 6 black spots: 1 proximad of r-m crossvein, 2nd at end of costa extending into cell R5, 3rd lying near base of vein M2, and the last 3 at the ends of veins M1, M2, and M3 + 4. Halter slightly infuscated.

*Abdomen*: Pale brown; pale yellowish distally, without pigmented genital sclerotization. One pear-shaped spermatheca (Fig. 11f) with conical sclerotized neck; measuring 0.075 ( $n = 3$ ) mm long  $\times$  0.050 ( $n = 3$ ) mm broad.

Male.—Unknown.

Distribution.—Colombia.

Types.—Holotype ♀, Colombia, Rio Raposo, vii.1965, V. H. Lee, light trap. Paratypes, 2 ♀, same data except iv.1963 and iv.1965.

Discussion.—The presence of 4 small but distinct black spots distally on the wing, in addition to the usual 2 large anterior spots, will serve to distinguish *Alluaudomyia sexpunctata*.

### *Alluaudomyia tenuiannulata* Spinelli and Wirth, NEW SPECIES

Fig. 12

Female.—Wing length 1.1 mm; breadth 0.5 mm.

*Head*: Uniformly brownish. Eyes bare, contiguous for a distance equal to diameter of 2 ommatidial facets. Antenna with lengths of flagellar segments in proportion of 27-19-17-19-19-20-21-23-26-27-30-28-40; antennal ratio 0.87. Palpus (Fig. 12b) with lengths of segments in proportion of 10-17-17-13-21; 3rd segment with distal sensory pit. Mandible with 15 (?) teeth.

*Thorax*: Dark brown, scutellum paler. Legs (Fig. 12d) brownish, coxae and trochanters brown. Femora with subapical pale rings; tibiae with subbasal and subapical pale rings; tarsi brownish; hind tarsal ratio 2.9; claws (Fig. 12c) long, slender, and unequal on all legs. Wing (Fig. 12a) with costal ratio 0.57; membrane lightly brownish, especially along veins; only 2 conspicuous black spots, 1 extending proximad of r-m crossvein, the 2nd lying over apex of costa and not extending into cell R5. Halter pale.

*Abdomen*: Dark brown. Genital sclerotization as in Fig. 12f. Spermatheca (Fig. 12e) pear-shaped, with conical sclerotized neck; measuring 0.068 mm long  $\times$  0.060 mm broad.

Male.—Wing length 0.95 mm; breadth 0.42 mm; costal ratio 0.47. Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 57-19-17-17-16-15-15-15-15-20-47-39-37; antennal ratio 0.92. Palpus with lengths of segments in proportion of 10-16-19-18-18.

*Genitalia* (Fig. 12g): Short; sternite 9 with shallow caudomedian excavation, posterior membrane not spiculate; tergite 9 progressively narrowing distad, with 2 low, rounded, apicolateral lobes. Gonocoxite moderately stout; gonostylus nearly straight. Aedeagus short, basal arch extending about  $\frac{2}{3}$  of total length; distomedian process short and moderately stout with blunt tip. Parameres (Fig. 12h) each with detached basal apodeme; main portion very stout and straight, distal portion abruptly recurved ventrad and tapering to sharp point.

Distribution.—Costa Rica, Guatemala.

Types.—Holotype ♀, Guatemala, Acantenango, 2.vii.1951, Gibson and Ascoli,



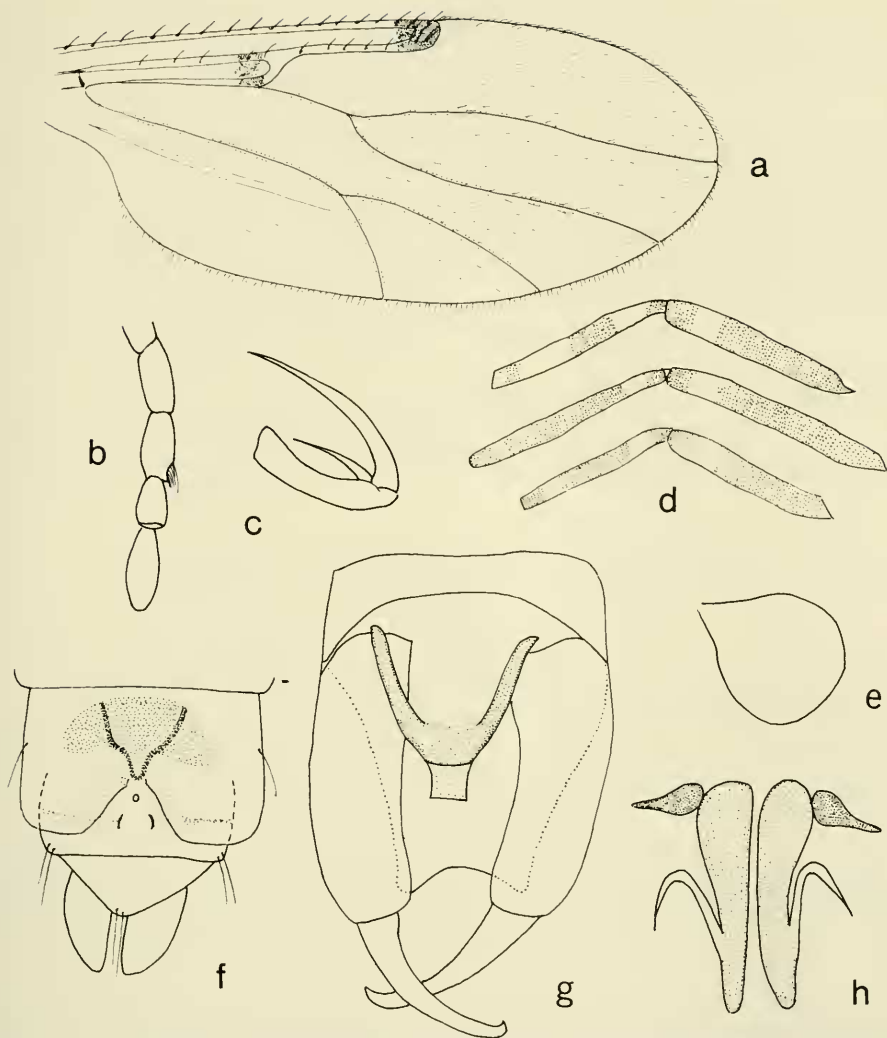


Fig. 12. *Alluaudomyia tenuiannulata*; a-f, female; g-h, male: a, wing; b, palpus; c, of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genital sclerotization; g, genitalia; h, parameres.

light trap. Allotype ♂, Costa Rica, Puntarenas, Sabalito, viii.1953, F. S. Blanton, light trap.

Discussion.—The species takes its name from the conspicuous, narrow pale rings on the legs, differing from the other small Neotropical *Alluaudomyia* with 2-spotted wing, *A. caribbeana*, *schancki*, and *youngi*, in which the pale bands are much more extensive. The female genital sclerotization is shaped similar to that of *A. schnacki* (Fig. 14k).

***Alluaudomyia tripunctata* Spinelli and Wirth, NEW SPECIES**

Fig. 13

Female.—Wing length 0.87 mm; breadth 0.38 mm.

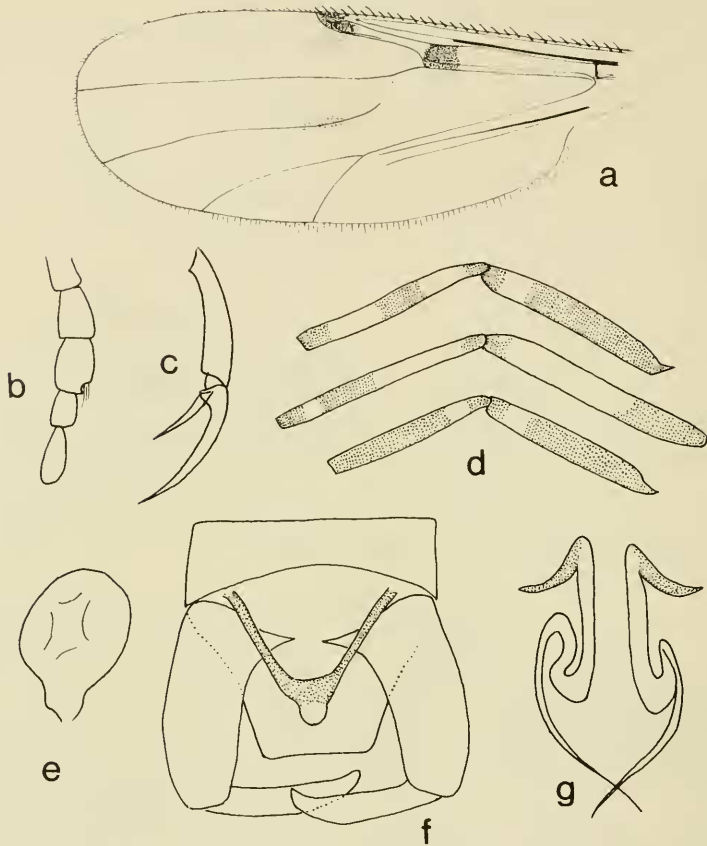


Fig. 13. *Alluaudomyia tripunctata*; a, f-g, male; b-e, female: a, wing; b, palpus; c, claws of all legs; d, femora and tibiae of (top to bottom) hind, mid and fore legs; e, spermatheca; f, genitalia; g, parameres.

**Head:** Light brownish. Eyes bare, contiguous for a distance equal to diameter of 2 ommatidial facets. Antenna brownish except bases of segments 3-10 pale; flagellar segments with lengths in proportion 20-15-14-17-18-18-20-20-20-24-27-25-33; antennal ratio 0.90. Palpus (Fig. 13b) with lengths of segments in proportion of 10-15-15-10-18; 3rd segment globose, with conspicuous distal pit bearing a long hyaline sensillum. Mandible with 12 teeth.

**Thorax:** Yellowish with dark brown mottlings; scutellum infuscated in mid-portion, bearing 4 setae. Legs (Fig. 13d) brownish, with pale rings subapically on femora and on mid and hind tibiae, and subbasally on all tibiae, the pale areas on each side of mid knee extensive; tarsi brownish; hind tarsal ratio 3.4. Claws (Fig. 13c) large, slender, and unequal on all legs. Wing (Fig. 13a) with costal ratio 0.56; membrane whitish; 3 black spots, 1 proximad of r-m crossvein, 2nd at end of costa, and 3rd smaller than the others, lying near base of vein M2. Halter with infuscated knob.

**Abdomen:** Yellowish; genital sclerotization not pigmented. One pear-shaped spermatheca (Fig. 13e), measuring 0.068 mm long  $\times$  0.046 mm broad.

Male.—Wing length 0.75 mm; breadth 0.29 mm; costal ratio 0.53. Similar to

female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 40-17-15-15-15-15-15-15-20-40-35-45; antennal ratio 1.05. Palpus with lengths of segments in proportion of 7-15-14-9-12. Hind tarsal ratio 2.7.

*Genitalia* (Fig. 13f): Short and broad, sternite 9 with shallow caudomedian excavation, posterior membrane not spiculate; tergite 9 short and tapering, more or less rounded, without apicolateral processes. Gonocoxite moderately stout, basomesal corner produced mesad in an angular process; gonostylus nearly straight. Aedeagus about as long as basal breadth, basal arch extending  $\frac{2}{3}$  of total length; distomedian process short and bluntly rounded, poorly sclerotized. Parameres (Fig. 13g) nearly identical with those for *Alluaudomyia leei*.

Distribution.—Colombia.

Types.—Holotype ♀, Colombia, Rio Raposo, 10.vi.1964, V. H. Lee, light trap. Allotype ♂, same data except 28.vii.1964.

Discussion.—This species is readily distinguished from its Neotropical congeners by its 3-spotted wing.

### *Alluaudomyia youngi* Spinelli and Wirth, NEW SPECIES

Fig. 14a–j

Female.—Wing length 1.0 mm; breadth 0.43 mm.

*Head*: Brownish. Eyes bare, contiguous for a distance equal to diameter of 2.5 ommatidial facets. Antenna brownish, bases of segments 3–10 pale; lengths of flagellar segments in proportion of 27-17-16-17-17-17-20-21-23-26-32-28-34; antennal ratio 0.94. Palpus (Fig. 14b) brownish; lengths of segments in proportion of 10-16-15-12-19; 3rd segment with conspicuous distal pit bearing a long hyaline sensillum. Mandible with 15–16 teeth, the distal 4 very strong.

*Thorax*: Uniformly light brown. Legs (Fig. 14f) brownish; coxae and trochanters brown; femora with pale rings subapically on fore and mid legs and distal  $\frac{1}{2}$  of hind leg; fore and mid tibiae with subbasal pale rings; hind tibia pale on proximal  $\frac{1}{3}$  and subapically; all knees pale; tarsi brownish; hind tarsal ratio 2.9. Tarsal claws (Fig. 14c–e) long and slender, subequal on fore leg, unequal on mid and hind legs. Wing (Fig. 14a) with costal ratio 0.54; membrane milky whitish; 2 black spots, one proximad of r-m crossvein, 2nd at end of costa and extending into cell R4 about  $\frac{1}{2}$  way to vein M1. Halter pale.

*Abdomen*: Light brown. Genital sclerotization prominent, as in Fig. 14h. One pear-shaped spermatheca (Fig. 14g) with conical sclerotized neck, measuring 0.068 mm long  $\times$  0.056 mm broad.

Male.—Similar to female with usual sexual differences. Antenna with lengths of flagellar segments in proportion of 46-16-15-14-13-12-12-12-13-15-38-41-46; antennal ratio 1.1.

*Genitalia* (Fig. 14i): Short; sternite 9 a narrow anterior band bordering a broad caudomedian excavation, posterior membrane spiculate; tergite 9 short, with rounded posterior margin without well-developed apicolateral processes. Gonocoxite short; gonostylus slender and curved, with distinct apical tooth. Aedeagus about as long as broad at base, basal arch very high, distomedian process short and bluntly rounded. Parameres (Fig. 14j) heavily sclerotized; each with long, slender recurved basal apodeme; mid portion a long, slender, curved blade; bearing

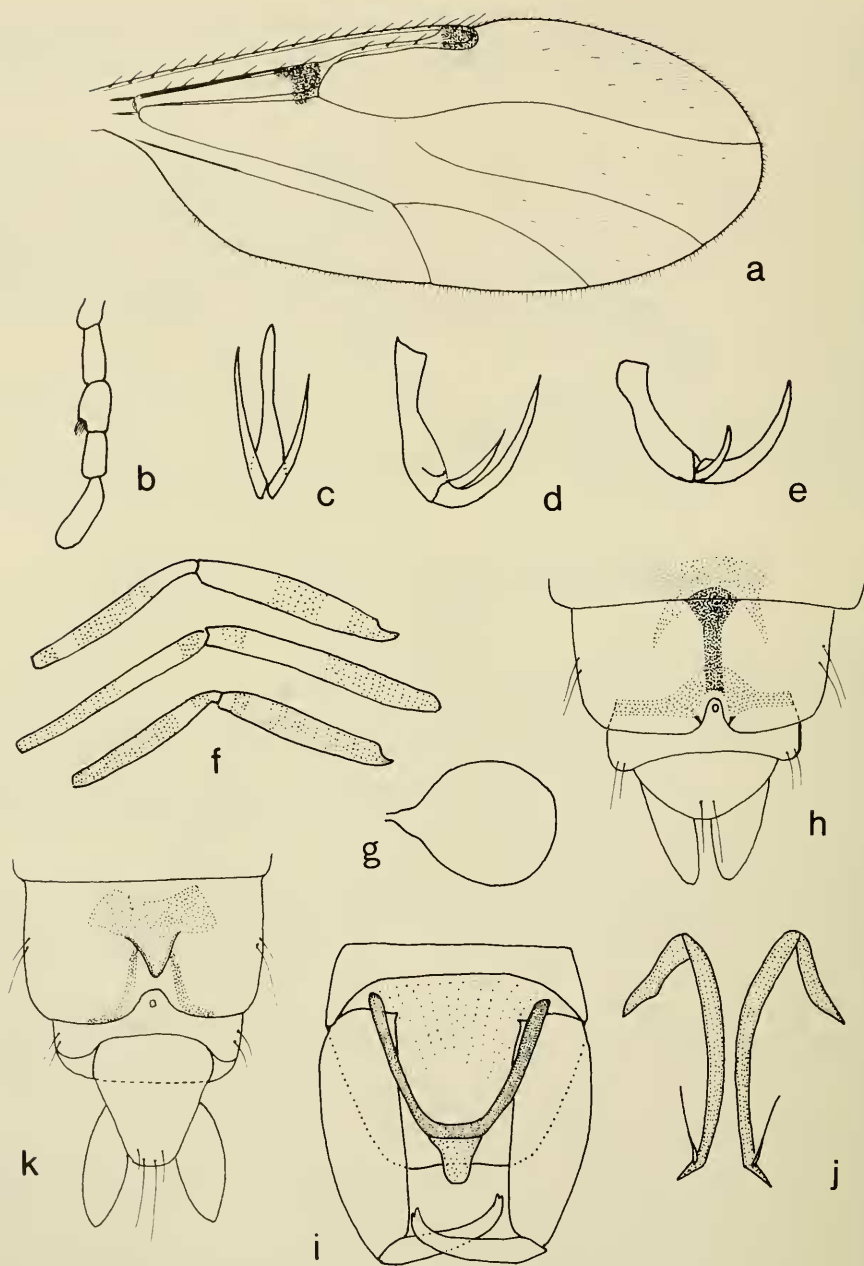


Fig. 14. *Alluaudomyia youngi*, a-j; *A. schnacki*, k; a-h, k, female; i-j, male: a, wing; b, palpus; claws of c, fore; d, mid, and e, hind legs; f, femora and tibiae of (top to bottom) hind, mid and fore legs; g, spermatheca; h, k, genital sclerotization; i, genitalia; j, parameres.

distally a short slender, filamentous process arising subapically and directed ventroproximad.

Distribution.—Colombia, Panama.

Types.—Holotype ♀, Colombia, Antioquia Dept., near Rio Anori, ix.1970, D. G. Young, blacklight trap in tropical rain forest. Allotype ♂, Panama, Canal Zone,

Gamboa, Pipeline Rd., vii.1967, W. W. Wirth, light trap. Paratype, 1 ♂, same data as holotype.

Discussion.—This species is named for David G. Young of the University of Florida in Gainesville, in recognition of his important contributions to our knowledge of Neotropical Diptera, especially phlebotomine sand flies.

*Alluaudomyia youngi* can readily be distinguished from the other small Neotropical species of *Alluaudomyia* with 2-spotted wings by the broadly pale hind knees. The male parameres are easily distinguished by the subapical origin of the short, filamentous distal process.

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#### NOTE

#### Distribution of *Xylosandrus germanus* (Blandford) (Coleoptera: Scolytidae) in Maryland

Weber and McPherson (Great Lakes Entomol. 15:172–174, 1982) state that *Xylosandrus germanus* (Blandford) is apparently not established in Maryland. Specimens in the collections of E. J. Ford, USDA APHIS, and C. L. Staines, Jr. provide the following Maryland records:

Anne Arundel County: Edgewater, 1 May 1982; Gambrills, 28 June 1976. Baltimore City: Leakin Park, 11 May 1976, off beech (*Fagus* sp.) and dead *Carpinus* sp. Baltimore County: Butler, 25 April 1976, off sassafras (*Sassafras albidum*); Granite, 18 April 1973, off *Pinus* sp. Somerset County: Shelltown, 10 May 1969, from sugar trap. Talbot County: Wittman, 25 May 1974.

These records show that *X. germanus* is widely distributed in Maryland. The collection from Shelltown shows that *X. germanus* was established in Maryland before the 1971 detection at the port of Baltimore to which Weber and McPherson (1982) referred.

Specimens have been deposited in the U.S. National Museum.

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